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RESEARCH ARTICLE

CLINICO-ETIOLOGICAL STUDY OF NEONATAL JAUNDICE IN A TERTIARY CARECENTRE IN AMBALA (HARYANA) INDIA

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ABSTRACT

Jaundice occurs in most newborn infants. Most jaundice is benign, but because of the potential toxicity of bilirubin, newborn infants must be monitored to identify those who might develop severe hyperbilirubinemia and, in rare cases, acute bilirubin encephalopathy or kernicterus. Many a times it is physiological. Assessment can be done both by invasive and non-invasive methods. Clinical assessment is by Kramers rule. Aims of the study were to clinically assess neonatal jaundice and evaluate the etiological factors responsible. One-hundred and fifty newborns were included in the study with the following inclusion criteria : all neonates developing jaundice and exclusion criteria : neonates developing jaundice after first two weeks of birth, who left against medical advice and where parents did not give consent for investigations. Babies were examined in broad day light to clinically assess level of jaundice and kramers rule was applied. Various investigations were done to determine serum bilirubin levels and find out the cause for jaundice. The study showed that the most common cause was Physiological (n=90 that is 60%) followed by Breast feeding jaundice (n=21 that is 14%), ABO incompatibility (n=19 that is 12.67%), Sepsis (n=15 that is 10%), RH incompatibility(n=4 that is 2.67%) and G6PD deficiency (n=1 that is 0.67%). Bilirubin levels of 115 (76.67%) neonates correlated with Kramer scoring based on visual assessment of cephalocaudal progression. There was no variation in the 17 neonates who had visual jaundice upto face, 38/47(80%) neonates with visual jaundice upto chest were with the rule with 20% variation, 37/55(67.27%) neonates with visual jaundice upto abdomen were with the rule with 32.73% variation, 9/16 (56.25%) neonates with visual jaundice upto thighs were with the rule with 43.75% variation. There was no variation in the 6 neonates who had visual jaundice upto legs while a variation of 11.11% was present in neonates with visual jaundice upto soles. Physiological jaundice is the most common cause of jaundice in newborn babies and Kramers rule is an efficient, easy, safe and non-invasive method to determine jaundice in newborn babies.

Key words: Jaundice, Kramers rule, Neonate, Serum bilirubin levels.

INTRODUCTION:

The word 'Jaundice' is derived from the French word 'Jaune' meaning yellow. Neonatal hyperbilirubinemia is a yellowing of the skin and other tissues of a newborn infant. In adults, jaundice is visible when serum bilirubin exceeds 2 mg/dl but in the newborn it is seen when the serum bilirubin exceeds 4 mg/dl [1]. Unlike in children and adults where all jaundice is pathological, in the newborn most jaundice is physiological [2]. Neonatal jaundice is one of the major cause of admission in newborn nurseries. Jaundice is observed during the 1st week of life in approximately 60% of term infants and 80% of preterm infants[3]. According to National Neonatal- Perinatal Database (NNPD) the incidence of neonatal hyperbilirubinemia in intramural live-births is 3.3% while in extramural admissions morbidity due to hyperbilirubinemia accounted for 22.1% [4]. In neonates, the dermal icterus is first noted in the face and as the bilirubin level rise it proceeds to the trunk and then to the extremities.This condition is common in newborns affecting over half (50–60%) of all babies in the first week of life[5].

Some babies are at an increased risk for developing jaundice: Babies who have Rh or ABO incompatibilty with their mothers, Babies with a lot of bruising to their scalp or face during delivery, Premature babies , Babies of

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diabetic mothers , sick newborns who may not feed well in the first few days of life [6]. Incidence varies with ethnicity and geography. Incidence is higher in East Asians and American Indians and lower in blacks. Greeks living in Greece have a higher incidence than those of Greek descent living outside of Greece [7]. Incidence is higher in populations living at high altitudes. Risk of developing significant neonatal jaundice is higher in male infants and is inversely proportional to gestational age [8].

Clinical Assessment: Kramer's rule

Originally described by Kramer[9], dermal staining of bilirubin may be used as a clinical guide to the level of jaundice. Dermal staining in newborn progresses in a cephalo-caudal direction. The newborn should be examined in good daylight. The skin should be blanched with digital pressure and the underlying color of skin and subcutaneous tissue should be noted [10].

The total serum bilirubin level can be roughly estimated clinically by the degree of caudal extension: face, 5 mg per dL; upper chest, 10 mg per dL; abdomen, 12 mg per dL; palms and soles, greater than 15 mg per dL[11]. Non-invasive bilirubinometry in neonatal jaundice. One of the newer devices (Chromatics Colormate 111, Chromatics Color Sciences International Inc., New York, NY) employs a sophisticated computer algorithm for assessing the underlying skin colour. The algorithm allows for the determination of yellow colour regardless of the underlying skin pigmentation, provided that an early determination of skin colour measurement is completed within the first 30 h of life [12]. The latest commercially available TcB device is the BiliChecV9 (SpectRx, Inc., Norcross, GA, USA) which measures transcutaneous bilirubin by utilizing the entire spectrum of visible light (380 to 760 nm) reflected by the skin[13]. Laboratory estimation of total and conjugated bilirubin based on Vanden Bergh reaction remains the gold standard for bilirubin estimation [14]. Carefully timed TSB measurements can be used to predict the chances of developing severe hyperbilirubinemia. It is recommended that TSB concentration be measured in all infants between 24 h and 72 h of life; if the infant does not require immediate treatment [15], the results should be plotted on the predictive nomogram to determine the risk of progression to severe hyperbilirubinemia[16].

MATERIAL AND METHODS:

The study was carried out in Neonatal unit of Department of Paediatrics of M.M Institute of Medical Sciences and Research, Mullana (Ambala), from november 2011 to july 2013A total of 150 cases were studied. It was a prospective analytical study.

All new born babies developing jaundice after two weeks of birth, who left against medical advice and whose parents did not give consent for investigations were excluded from the study.

Informed consent was obtained from parents on performa before evaluating each patient. All neonates were monitored in natural day light for appearance of jaundice clinically. Thorough physical examination including degree of icterus, pallor, neurological assessment and naked eye examination of stool was done. Both direct and indirect fractions of bilirubin in the serum were determined. Neonates were further investigated in the light of gathered information and the provisional diagnosis. Clinical assessment of jaundice was based on Kramer's rule of cephalocaudal progression of jaundice. Patients' characteristics and general data were documented including age, sex, place of birth, geographical area, birth weight, age at onset of jaundice, previous history of jaundice in siblings and administration of any drugs since birth. Maternal history including gestational age, intake of any drugs and if yes during which trimester, onset of labour (spontaneous or induced, delivery (vaginal or caesarian), type of anaesthesia, feeding (artificial, breast, mixed). Gestational age was determined based on last menstrual period.

RESULTS:

TABLE 1: KRAMER'S RULE - ICTERUS AS NOTED

	4-5.9	6-7.9	8-9.9	10-11.9	12-14.9	>=15	WITH RULE	VARIATION	INCIDENCE
FACE	17	-	-	-	-	-	100%	0	11.33%
CHEST	1	38	8	-	-	-	80%	20%	31.33%
ABDOMEN	-	1	37	17	-	-	67.27%	32.73%	49.33%
THIGHS	-	-	-	9	7	-	56.25%	43.75%	10.67%
LEGS	-	-	-	-	6	-	100%	0	4%
SOLES	-	-	-	-	1	8	88.89%	11.11%	6%

TABLE 2: DISTRIBUTION ACCORDING TO ETIOLOGY

ETIOLOGY	NO. OF NEONATES	PERCENTAGE (%)
ABO INCOMPATIBILITY	19	12.67
RH INCOMPATIBILITY	04	2.67
BREAST FEEDING	21	14
SEPSIS	15	10
G6PD DEFICIENCY	1	0.67
PHYSIOLOGICAL	90	60

TABLE 3: SEX DISTRIBUTION OF NEONATES

SEX	NO. OF NEONATES	PERCENTAGE (%)
MALE	97	64.67
FEMALE	53	35.33

TABLE 4: DISTRIBUTION ACCORDING TO PLACE OF BIRTH

PLACE OF BIRTH	NO. OF NEONATES	PERCENTAGE (%)
INBORN	139	92.67
OUTBORN	11	7.33

TABLE 5: DISTRIBUTION ACCORDING TO GEOGRAPHICAL AREA

GEOGRAPHICAL AREA	NO. OF NEONATES	PERCENTAGE (%)
RURAL	122	81.33
URBAN	28	18.67

TABLE 6- DISTRIBUTION ACCORDING TO BIRTH WEIGHT

	BIRTH WEIGHT (gm)	NO. OF NEONATES	PERCENTAGE (%)
Low birth weight (<2500g)	<1500	4	2.67
	1500-1999	14	9.33
	2000-2499	21	14
Adequate birth weight (>=2500g)	2500-2999	64	42.67
	>=3000	47	31.33

TABLE 7: STUDY OF ANTENATAL CARE

ANTENATAL CARE	NO. OF INFANTS	PERCENTAGE (%)
ADEQUATE	121	80.67
INADEQUATE	29	19.33

TABLE 8: TOTAL SERUM BILIRUBIN LEVELS

TOTAL SERUM BILIRUBIN	NO. OF INFANTS	PERCENTAGE (%)
<15	142	94.67
>=15	8	5.33

DISCUSSION AND CONCLUSION:

In these study bilirubin levels of 115/150 (76.67%) neonates correlated with Kramer scoring based on visual assessment of cephalocaudal progression. There was no variation in the 17(100%) infants who had visual jaundice upto face, 38/47(80%) infants with visual jaundice upto chest were with the rule and 9/47(20%) with variation, 37/55(67.27%) infants with visual jaundice upto abdomen were with the rule and 18/55(32.73%) with variation, 9/16 (56.25%) infants with visual jaundice upto thighs were with the rule and 7/16(43.75%) with variation. There was no variation in the 6(100%)infants who had

visual jaundice upto legs while 1/9(11.11%) infant had variation with visual jaundice upto soles. the commonest cause of hyperbilirubinemia was physiological 90/150 (60%) followed by breast feeding jaundice 21/150 (14%), ABO incompatibility 19/150(12.67%), sepsis15/150 (10%), Rh incompatibility 4/150 (2.67%) and G6PD deficiency 1/150 (0.67%). it was observed that hyperbilirubinemia was seen more in males as compared to females. The number of male neonates was 97/150 (64.67%) while that of female patients was 53/150 (35.33%). The male:female ratio was 1.83:1. It was found that majority of the neonates were inborns 139/150 (92.67%) as compared to outborns 11/150 (7.33%). it was found that majority of the neonates were from rural area 122/150 (81.33%) as compared to urban area 28/150 (18.67%). In this study 39/150 (26%) neonates were low birth weight babies whereas 111/150 (74%) had adequate birth weight. In this study 121/150 (80.67%) mothers had received adequate antenatal care while only 29/150 (19.33%) received inadequate antenatal care.

In this study 142/150 (94.67%) neonates presented with a maximum total serum bilirubin of <15 mg/dl while only 8/150 (5.33%) had a serum bilirubin of >=15. The mean serum bilirubin calculated was 9.14±3.09mg/dl.

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